DESCRIPTION • INSTALLATION • MAINTENANCE

INSTRUCTIONS

WESTINGHOUSE RADIATORS

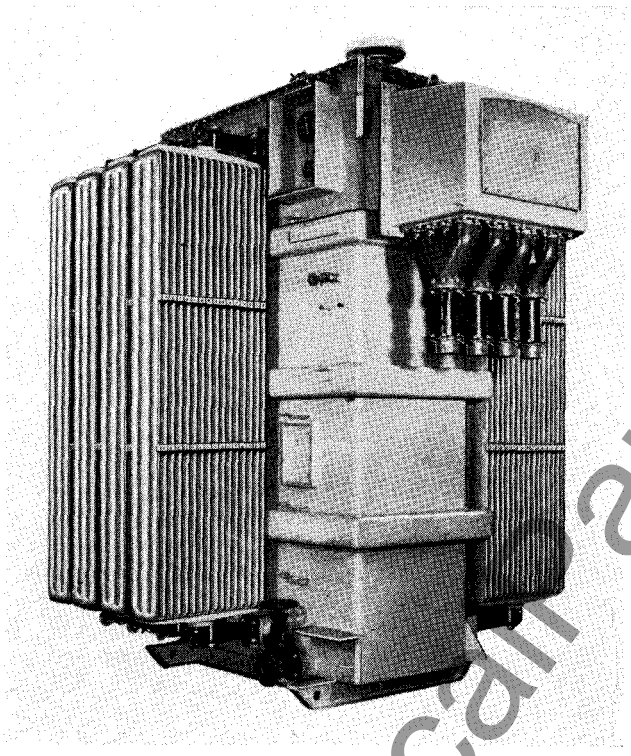

FIG. 1. Westinghouse Single Radiators Mounted Perpendicular to the Wall of a Rectangular Tank on a 6,000 KVA Transformer

THE WESTINGHOUSE RADIATOR is a highly efficient cooling unit which is designed for use on large self-cooled transformers where high cooling capacities are required. It is detachable and may be removed for shipment, which reduces shipping clearances and relieves tank wall stresses which might develop due to sudden shocks in transportation.

DESCRIPTION

The radiator is of all-welded sheet metal construction, with vertical cooling sections through which the oil circulates and is cooled. A pressed metal header, welded to each end of the assembly of sections, complete the structure and provides connections for the fittings which attach the radiator to the tank.

The individual sections are made from two flat sheets of steel of the same length, each of which is 11⅝ inches wide. To secure different lengths of radiators, these assemblies are made in lengths from four feet to fourteen feet, varied in steps of approximately one foot. The side edges of these sheets are welded together by an automatic resistance seam welding machine. Welded seams are made along the centerline the entire length of the section except for about six inches at each end. Air pressure is applied at one end of an element so that the sheets are forced apart and given a permanent set, where not restrained by the welds, to limits imposed by a restraining mould, thus forming the ducts for oil circulation.

The ends are then sheared off and formed as shown in Fig. 3. This forming of the ends provides a means for proper spacing of sections, external welding surfaces and a "hip roof" shape which eliminates horizontal surfaces between sections and insures complete drainage. A pressed metal cap is welded to the formed ends of the section assembly, thus completing the structure and providing means of attaching the radiator to the transformer tank.

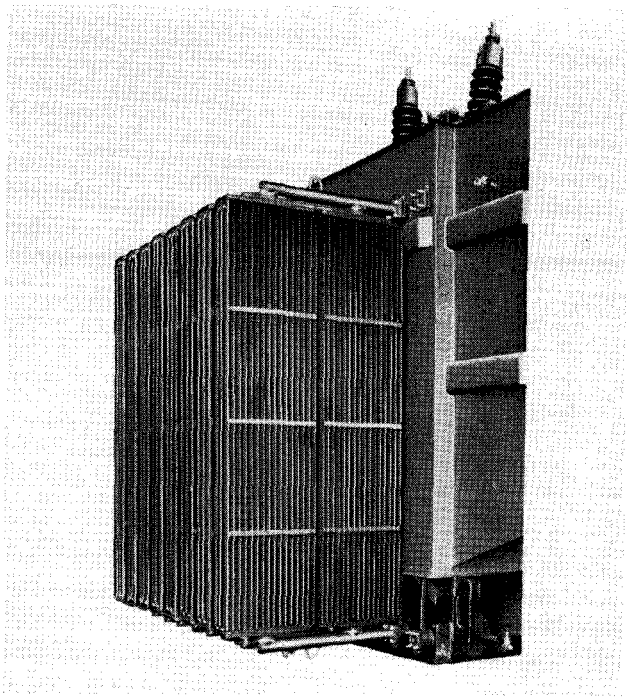

FIG. 2. Westinghouse Tandem Radiators Mounted Perpendicular to the Wall of a Form-Fit Tank on a 35,000 KVA Transformer

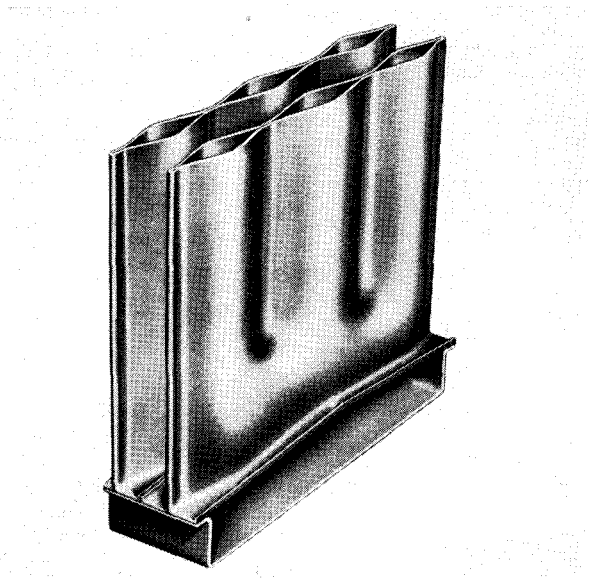

FIG. 3. Radiator Section Showing Joints Formed With Outside Welds

All joints are formed with outside edge welds which are reliable, easy to make, and permit a damaged joint to be repaired easily. Edges are trimmed and rounded for better paint adhesion. In order to produce an all over better paint job, each radiator is first Parkerized. Then it is given one coat of primer, followed by two coats of finish paint. Each coat of paint is applied by the flow coat method and baked on in an infra-red lamp oven.

In flow coat painting, the paint is actually flowed over the surface and the surplus allowed to drain back into the main paint reservoir. This method insures complete and even paint coverage with a maximum thickness.

The "hip roof" surfaces between sections and the sloping surfaces on the caps contain no flat surfaces where water can collect and cause rusting. The weld between the sections and the caps is scalloped between sections so that any bead formed by the welding operation will be depressed, insuring that no water can collect at this point.

INSTALLATION

Receiving, Handling and Storing. The usual practice is to ship all radiators with all openings on the tank and radiators protected with blind flanges. The blind flanges and shipping gaskets are for shipment only and must be replaced by the gaskets supplied for permanent mounting. Sufficient gasket cement M# 7386 and cadmium plated bolts, nuts and lock washers are also furnished for permanent mounting.

Important: Do not remove the blind flanges until ready to install the radiators. It is necessary to keep all dirt and moisture from getting inside the radiators.

Unpacking. When unpacking, lifting or handling the radiators, care must be taken to prevent scratching the paint or damaging the radiator elements. An ample supply of grey touch-up paint is furnished to repaint any minor scratches. This paint should be applied as the radiators are being prepared for mounting. It is recommended that the radiators be lifted from the shipping crate using manila rope with sling spreaders to prevent damaging the radiator elements. For single radiators, wire rope or chain may be used for horizontal lifting if two 3/4 x 6 inch bolts are screwed into the tapped holes at each end of the radiator and the rope or chain is passed under the bolts. A 3/4 inch eye bolt screwed into each end of the radiator is another convenient way of lifting or handling with hooks.

Installing Single Radiators. Radiator elbows are shipped separately from the radiators. These elbows should be mounted on the radiators, and the assembly mounted on the transformer tank.

It will be found most convenient to place the radiator across suitable supports when preparing it for mounting to the tank.

First, remove the blind flanges from a radiator and clean the gasket grooves and flange faces of all paint, varnish, gasket material, etc. Similarly, clean the machined surfaces of the cast elbow. Make sure that the elbow is clean and dry. Next, apply a liberal coating of gasket cement M# 7386 to the gasket groove on the radiator, the gaskets and mating surface of the cast elbow. Allow the cement to become tacky before bolting the elbows to the radiator. To insure a leak-proof assembly, the elbow need be tightened only until a complete metal-to-metal contact is made. This assembly is

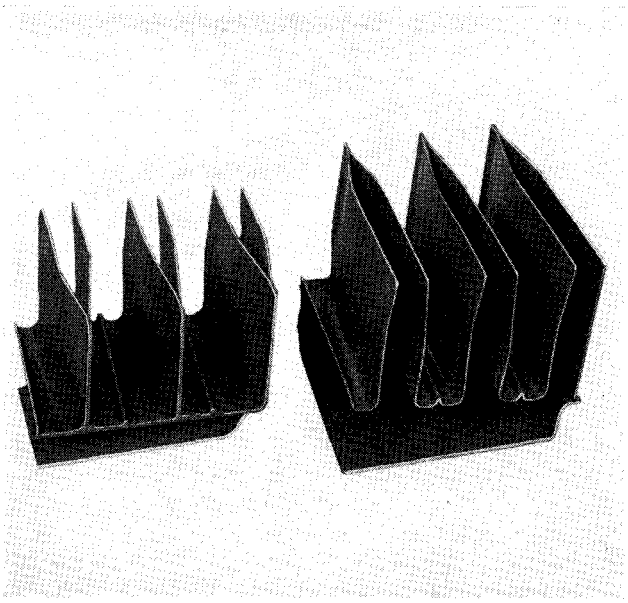

FIG. 4. Radiator Section Showing Fanned-Out Tubes

designed to have the proper compressive and retentive forces exerted on the gasket material and efforts toward further tightening may result in breakage of the cast metal parts.

Second, remove the blind flanges from a set of valves on the transformer tank (see Fig. 2) and clean the gasket grooves and flange faces in a manner similar to that described above. Apply a liberal coating of gasket cement M#7386 to the gasket grooves, gaskets and mating surfaces of the elbows; again allow the cement to become tacky before mounting the radiator to the tank. Be sure the 3/4 inch studs are screwed tight against the shoulder on the stud before mounting the radiator.

Now lift the prepared radiator by the lifting eye in the top elbow and swing it into position over the valves. If the radiator assembly does not fit perfectly and is a little long, the following procedure may be found effective.

Fit the elbow flange to the top valve first and apply a jacking force to the bottom elbow to slide into place. If the radiator assembly is short, fit the bottom elbow flange first and pull the top elbow flange up into position.

Lifting of the radiator can be accomplished by using an overhead crane, an A-frame with block and tackle or by block and tackle to the station superstructure.

The weight of a single radiator assembled with elbows is 540 pounds (6 feet length); 760 pounds (9 feet); 980 pounds (12 feet); 1120 pounds (14 feet).

Installing Tandem Radiators. The procedure for mounting tandem radiators is essentially the same as for single radiators. One of the details that may cause difficulty is the assembly of the radiators to the tandem headers. It is suggested that all the bolts for both headers be started before the headers are drawn down tightly. The end spacer strips may also cause some difficulty if they are not bolted into position before the radiator assembly is drawn down tightly to the tank. Caution must then be exercised to insure a good metal-to-metal contact between the header and the tank valve body.

All other preparation and mounting details remain the same as for single mounted radiators.

Filling of Radiators. To fill a radiator, turn the bottom valve to the open position as indicated on the operating arm and thus allow the liquid from the main tank to flow into the radiator. Secure the valve in this open position by means of the brass thumb screw. Next, open the top valve and allow the entrapped air to escape. Care must be taken that the terminal boards or bridge work of the transformer are not exposed above the liquid in this operation. If there is danger of exposing the terminal boards or bridge, liquid should be added to replace that required to fill each radiator. After all radiators have been filled the normal liquid level should be restored as soon as possible or within a couple of hours.

Radiator Removal. Should it become necessary to remove a radiator, first close the valves top and bottom. Lock the operating arm in the closed position with the brass thumb screw. Finger tightness will provide sufficient pressure to seat the valve. Next, drain the liquid from the radiator by removing the 3/4 inch drain plug from the bottom elbow or header and the 3/4 inch vent plug from the top. After the liquid has been removed from the radiator, proceed to dismantle. If the radiator is to be left off for any length of time the transformer valves should be gasketed and covered with blind flanges. The openings in the radiators should also be gasketed and flanged to keep out dirt and moisture.

MAINTENANCE

The only maintenance required for the radiators consists of repainting or touch up, to keep the surface free from rust. The radiator element wall is of a necessity thin in section for proper cooling, and being of steel construction, is susceptible to rust and possible rupture, unless protected by a good paint finish. The open element construction permits thorough cleaning of all surfaces for repaint or touch up. This ease of accessibility insures a better finish, longer radiator life and the least possible cost of maintenance. Standard finish paint for transformer tanks can be applied as touch-up paint.

A special cleaning tool has been developed for removing rust spots or preparing the radiator surface for painting. For information about this tool, refer to Transformer Renewal Parts Catalog E-1-11.

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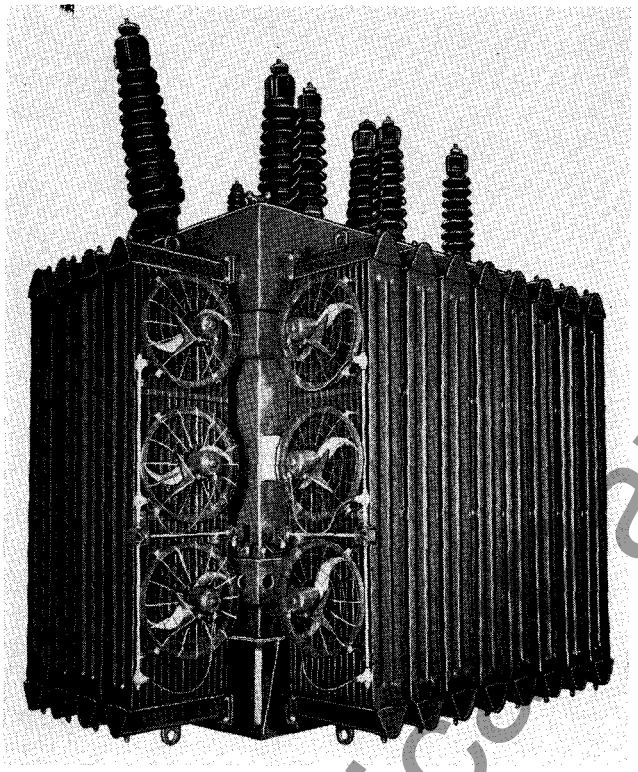

FIG. 1. Westinghouse Single Radiators Mounted Perpendicular to the Wall of a Form-Fit Tank

THE WESTINGHOUSE RADIATOR is a highly efficient cooling unit which is designed for use on large self-cooled transformers where high cooling capacities are required. It is detachable and may be removed for shipment, which reduces shipping clearances and relieves tank wall stresses which might develop due to sudden shocks in transportation.

DESCRIPTION

The radiator is of all-welded sheet metal construction, with vertical cooling sections through which the oil circulates and is cooled. A formed metal header, welded to each end of the assembly of sections, complete the structure and provides connections for the fittings which attach the radiator to the tank.

The individual sections are made from two flat sheets of steel of the same length, each of which is 11⅝ inches wide. To secure different lengths of radiators, these assemblies are made in lengths from four feet to fourteen feet, varied in steps of approximately one foot. The side edges of these sheets are welded together by an automatic resistance seam welding machine. Welded seams are made along the centerline the entire length of the section except for about six inches at each end. Air pressure is applied at one end of an element so that the sheets are forced apart and given a permanent set, where not restrained by the welds, to limits imposed by a restraining mould, thus forming the ducts for oil circulation.

The ends are then sheared off and formed as shown in Fig. 3. This forming of the ends provides a means for proper spacing of sections, external welding surfaces and a "hip roof" shape which eliminates horizontal surfaces between sections and insures complete drainage. The formed header is welded to the formed ends of the section assembly, thus completing the structure and providing means of attaching the radiator to the transformer tank.

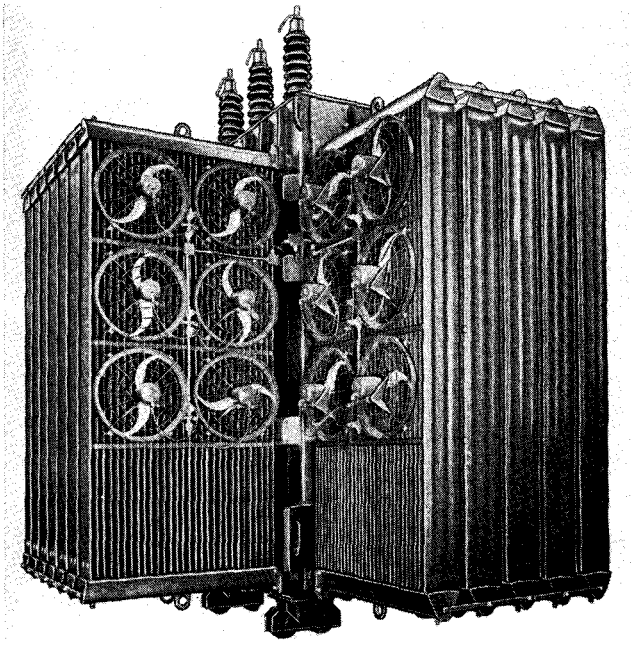

FIG. 2. Westinghouse Double Radiators Mounted Perpendicular to the Wall of a Form-Fit Tank

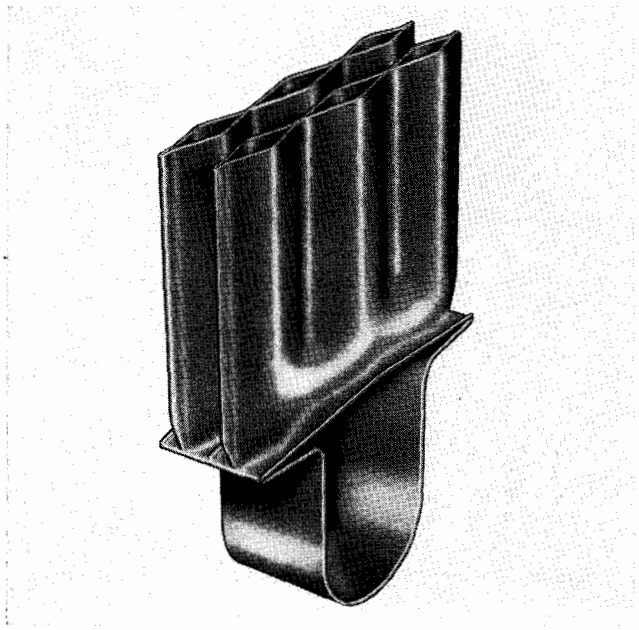

FIG. 3. Radiator Section Showing Joints Formed With Outside Welds

All joints are formed with outside edge welds which are reliable, easy to make, and permit a damaged joint to be repaired easily. Edges are trimmed and rounded for better paint adhesion. In order to produce an all over better paint job, each radiator is given a heavy phosphate coating. Then it is given one coat of primer, followed by two coats of finish paint. Each coat of paint is applied by the flow coat method and baked on in an infra-red lamp oven.

In flow coat painting, the paint is actually flowed over the surface and the surplus allowed to drain back into the main paint reservoir. This method insures complete and even paint coverage with a maximum thickness.

The "hip roof" surfaces between sections and the sloping surfaces on the caps contain no flat surfaces where water can collect and cause rusting. The weld between the sections and the header is scalloped between sections so that any bead formed by the welding operation will be depressed, insuring that no water can collect at this point.

INSTALLATION

Receiving, Handling and Storing. The usual practice is to ship all radiators with all openings on the tank and radiators protected with blind flanges. The blind flanges and shipping gaskets are for shipment only and must be replaced by the gaskets supplied for permanent mounting. Sufficient gasket cement M# 7386 and cadmium plated bolts, nuts and lock washers are also furnished for permanent mounting.

Important: Do not remove the blind flanges until ready to install the radiators. Dirt and moisture must be kept out of the radiators.

Unpacking. When unpacking, lifting or handling the radiators, care must be taken to prevent scratching the paint or damaging the radiator elements. An ample supply of grey touch-up paint is furnished to repaint any minor scratches. This paint should be applied as the radiators are being prepared for mounting. It is recommended that the radiators be lifted from the shipping crate using manila rope with sling spreaders to prevent damaging the radiator elements.

Installing Single Radiators. It will be found most convenient to place the radiator across suitable supports when preparing it for mounting to the tank.

First, remove the blind flanges from a radiator and clean the gasket grooves and flange faces of all paint, varnish, gasket material, etc.

Second, remove the blind flanges from a set of valves on the transformer tank and clean the gasket grooves and flange faces. Apply a liberal coating of gasket cement M# 7386 to the gasket grooves, gaskets and mating surfaces of the radiator flange; again allow the cement to become tacky before mounting the radiator to the tank. Be sure the 3/4 inch studs are screwed tight against the shoulder on the stud before mounting the radiator.

Now lift the prepared radiator by the lifting eye in the top header and swing it into position over the valves.

Lifting of the radiator can be accomplished by using an overhead crane, an A-frame with block and tackle or by block and tackle to the station superstructure.

The weight of a single radiator assembled with elbows is 540 pounds (6 feet length); 760 pounds (9 feet); 980 pounds (12 feet); 1120 pounds (14 feet).

Installing Double Radiators. The procedure for mounting double radiators is essentially the same as for single radiators. The end spacer strips may cause some difficulty if they are not bolted into position before the radiator assembly is drawn down tightly to the tank. Caution must then be exercised to insure a good metal-to-metal contact between the header and the tank valve body.

All other preparation and mounting details remain the same as for single mounted radiators.

Filling of Radiators. To fill a radiator, turn the bottom valve to the open position as indicated on the operating arm and thus allow the liquid from the main tank to flow into the radiator. Secure the valve in this open position by means of the brass thumb screw. Next, open the top valve and allow the entrapped air to escape. Care must be taken that the terminal boards or bridge work of the transformer are not exposed above the liquid in this operation. If there is danger of exposing the terminal boards or bridge, liquid should be added to replace that required to fill each radiator.

After all radiators have been filled the normal liquid level should be restored as soon as possible or within a couple of hours.

Radiator Removal. Should it become necessary to remove a radiator, first close the valves top and bottom. Lock the operating arm in the closed position with the brass thumb screw. Finger tightness will provide sufficient pressure to seat the valve. Next, drain the liquid from the radiator by removing the 3/4 inch drain plug from the bottom header and the 3/4 inch vent plug from the top. After the liquid has been removed from the radiator, proceed to dismantle. If the radiator is to be left off for any length of time the transformer valves should be gasketed and covered with blind flanges. The openings in the radiators should also be gasketed and flanged to keep out dirt and moisture.

MAINTENANCE

The only maintenance required for the radiators consists of repainting or touch up, to keep the surface free from rust. The radiator element wall is of a necessity thin in section for proper cooling, and being of steel construction, is susceptible to rust and possible rupture, unless protected by a good paint finish. The open element construction permits thorough cleaning of all surfaces for repaint or touch up. This ease of accessibility insures a better finish, longer radiator life and the least possible cost of maintenance. Standard finish paint for transformer tanks can be applied as touch-up paint.

A special cleaning tool has been developed for removing rust spots or preparing the radiator surface for painting. For information about this tool, refer to Transformer Renewal Parts Catalog E-1-11.

If the packing gland at the valve operating arm leaks and requires tightening it is necessary to remove the external arm (remove one screw) to get access to the gland nut.

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WESTINGHOUSE RADIATORS

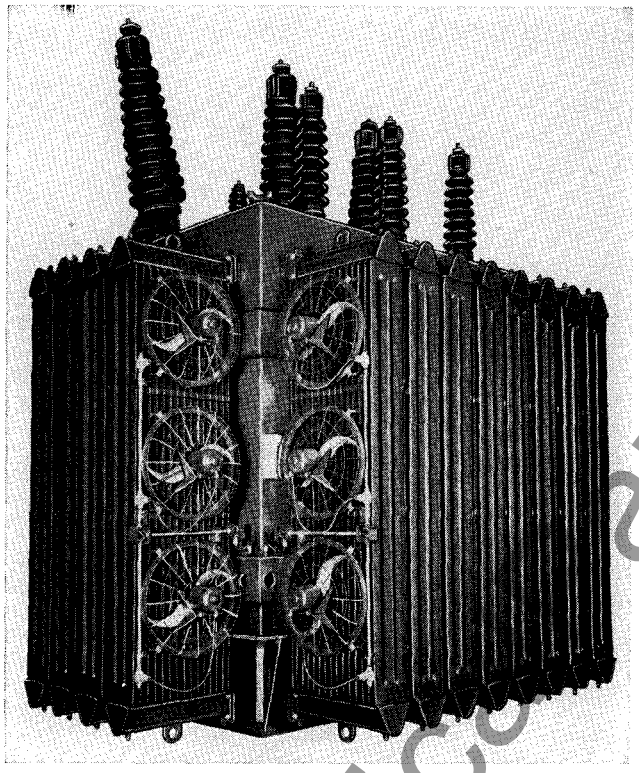

FIG. 1. Westinghouse 15 Fin Radiators Mounted Perpendicular to the Wall of a Form-Fit Tank

THE WESTINGHOUSE RADIATOR is a highly efficient cooling unit which is designed for use on large self-cooled transformers where high cooling capacities are required. It is detachable and may be removed for shipment, which reduces shipping clearances and relieves tank wall stresses which might develop due to sudden shocks in transportation.

DESCRIPTION

The radiator is of all-welded sheet metal construction, with vertical cooling sections through which the oil circulates and is cooled. A formed metal header, welded to each end of the assembly of sections, complete the structure and provides connections for the fittings which attach the radiator to the tank.

The individual sections are made from two flat sheets of steel of the same length, each of which is 11⅝ inches wide. To secure different lengths of radiators, these assemblies are made in lengths from four feet to fourteen feet, varied in steps of approximately one foot. The side edges of these sheets are welded together by an automatic resistance seam welding machine. Welded seams are made along the centerline the entire length of the section except for about six inches at each end. Air pressure is applied at one end of an element so that the sheets are forced apart and given a permanent set, where not restrained by the welds, to limits imposed by a restraining mould, thus forming the ducts for oil circulation.

The ends are then sheared off and formed as shown in Fig. 3. This forming of the ends provides a means for proper spacing of sections, external welding surfaces and a "hip roof" shape which eliminates horizontal surfaces between sections and insures complete drainage. The formed header is welded to the formed ends of the section assembly, thus completing the structure and providing means of attaching the radiator to the transformer tank.

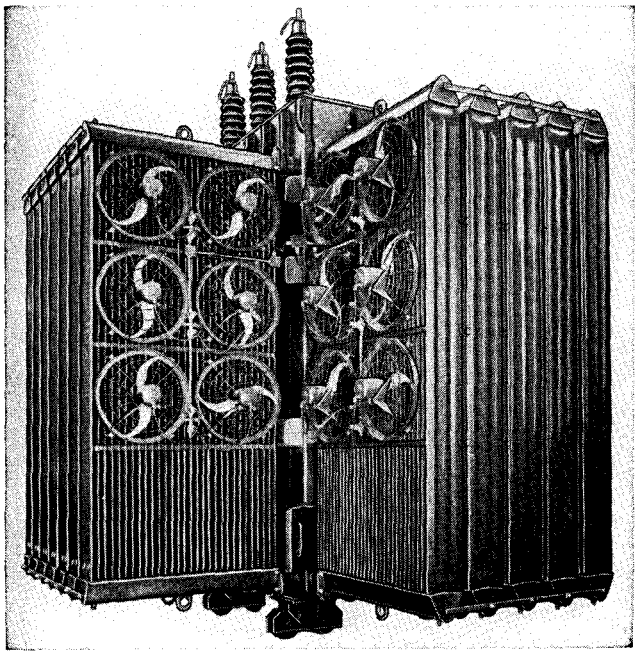

FIG. 2. Westinghouse 30-Fin Radiators Mounted Perpendicular to the Wall of a Form-Fit Tank

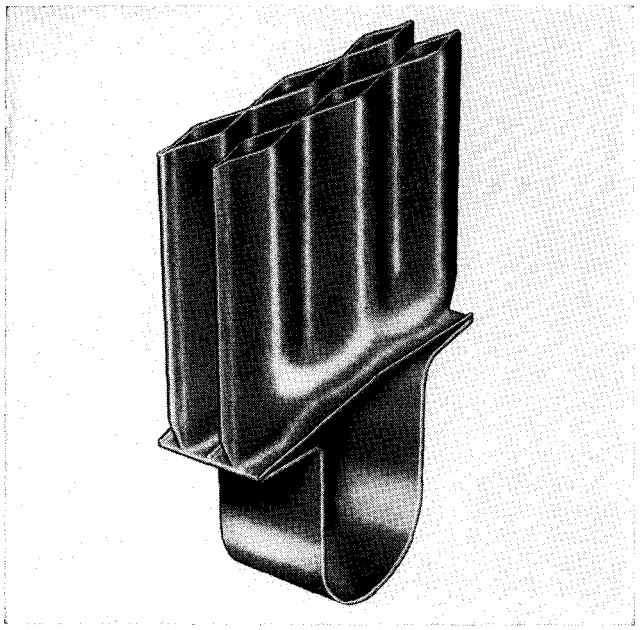

FIG. 3. Radiator Section Showing Joints Formed With Outside Welds

All joints are formed with outside edge welds which are reliable, easy to make, and permit a damaged joint to be repaired easily. Edges are trimmed and rounded for better paint adhesion. In order to produce an all over better paint job, each radiator is given a heavy phosphate coating. Then it is given one coat of primer, followed by two coats of finish paint. Each coat of paint is applied by the flow coat method and baked on in an infra-red lamp oven.

In flow coat painting, the paint is actually flowed over the surface and the surplus allowed to drain back into the main paint reservoir. This method insures complete and even paint coverage with a maximum thickness.

The "hip roof" surfaces between sections and the sloping surfaces on the caps contain no flat surfaces where water can collect and cause rusting. The weld between the sections and the header is scalloped between sections so that any bead formed by the welding operation will be depressed, insuring that no water can collect at this point.

INSTALLATION

Receiving, Handling and Storing. The usual practice is to ship all radiators with all openings on the tank and radiators protected with blind flanges. The blind flanges and shipping gaskets are for shipment only and must be replaced by the gaskets supplied for permanent mounting. Sufficient gasket cement M#7386 and cadmium plated bolts, nuts and lock washers are also furnished for permanent mounting.

Important: Do not remove the blind flanges until ready to install the radiators. Dirt and moisture must be kept out of the radiators.

Unpacking. When unpacking, lifting or handling the radiators, care must be taken to prevent scratching the paint or damaging the radiator elements. An ample supply of grey touch-up paint is furnished to repaint any minor scratches. This paint should be applied as the radiators are being prepared for mounting. It is recommended that the radiators be lifted from the shipping crate using manila rope with sling spreaders to prevent damaging the radiator elements.

Installing Radiators. It will be found most convenient to place the radiator across suitable supports when preparing it for mounting to the tank.

First, remove the blind flanges from a radiator and clean the gasket grooves and flange faces of all paint, varnish, gasket material, etc.

Second, remove the blind flanges from a set of valves on the transformer tank and clean the gasket grooves and flange faces. Apply a liberal coating of gasket cement M#7386 to the gasket grooves, gaskets and mating surfaces of the radiator flange; again allow the cement to become tacky before mounting the radiator to the tank. Be sure the 3/4 inch studs are screwed tight against the shoulder on the stud before mounting the radiator.

Now lift the prepared radiator by the lifting eye in the top header and swing it into position over the valves.

Lifting of the radiator can be accomplished by using an overhead crane, an A-frame with block and tackle or by block and tackle to the station superstructure.

The end spacer strips on the 30-fin radiator may cause some difficulty if they are not bolted into position before the radiator assembly is drawn down tightly to the tank. Caution must then be exercised to insure a good metal-to-metal contact between the header and the tank valve body.

Weight of Radiators

LENGTH FEET	15-FIN		23-FIN		30-FIN	
	Dry Weight	Gals. oil	Dry Weight	Gals. Oil	Dry Weight	Gals. Oil
4	315	17.5	530	30	710	41.5
5	390	21	630	35.5	840	49.
6	465	25	730	41	970	56.5
7	540	28.5	830	46.5	1100	64.
8	615	32	930	52	1230	71.5
9	690	35.5	1030	57.5	1360	78.
10	765	39	1130	63	1490	85.5
11	840	43	1230	68.5	1620	93.
12	915	46.5	1330	74	1750	100.5
13	990	50	1430	79.5	1880	108.
14	1065	53.5	1530	85	2010	115.5

Filling of Radiators. To fill a radiator, turn the bottom valve to the open position as indicated on the operating arm and thus allow the liquid from the main tank to flow into the radiator. Secure the valve in this open position by means of the thumb screw. Next, open the top valve and allow the entrapped air to escape. Care must be taken that the terminal boards or bridge work of the transformer are not exposed above the liquid in this operation. If there is danger of exposing the terminal boards or bridge, liquid should be added to replace that required to fill each radiator. After all radiators have been filled the normal liquid level should be restored as soon as possible or within a couple of hours.

Radiator Removal. Should it become necessary to remove a radiator, first close the valves top and bottom. Lock the operating arm in the closed position with the thumb screw. Finger tightness will provide sufficient pressure to seat the valve. Next, drain the liquid from the radiator by removing the ¾ inch drain plug from the bottom header and the ¾ inch vent plug from the top. After the liquid has been removed from the radiator, proceed to dismantle. If the radiator is to be left off for any length of time the transformer valves should be gasketed and covered with blind flanges. The openings in the radiators should also be gasketed and flanged to keep out dirt and moisture.

MAINTENANCE

The only maintenance required for the radiators consists of repainting or touch up, to keep the surface free from rust. The radiator element wall is of a necessity thin in section for proper cooling, and being of steel construction, is susceptible to rust and possible rupture, unless protected by a good paint finish. The open element construction permits thorough cleaning of all surfaces for repaint or touch up. This ease of accessibility insures a better finish, longer radiator life and the least possible cost of maintenance. Standard finish paint for transformer tanks can be applied as touch-up paint.

A special cleaning tool has been developed for removing rust spots or preparing the radiator surface for painting. For information about this tool, refer to Transformer Renewal Parts Catalog E-1-11.

If the packing gland at the valve operating arm leaks and requires tightening it is necessary to remove the external arm (remove one screw) to get access to the gland nut.

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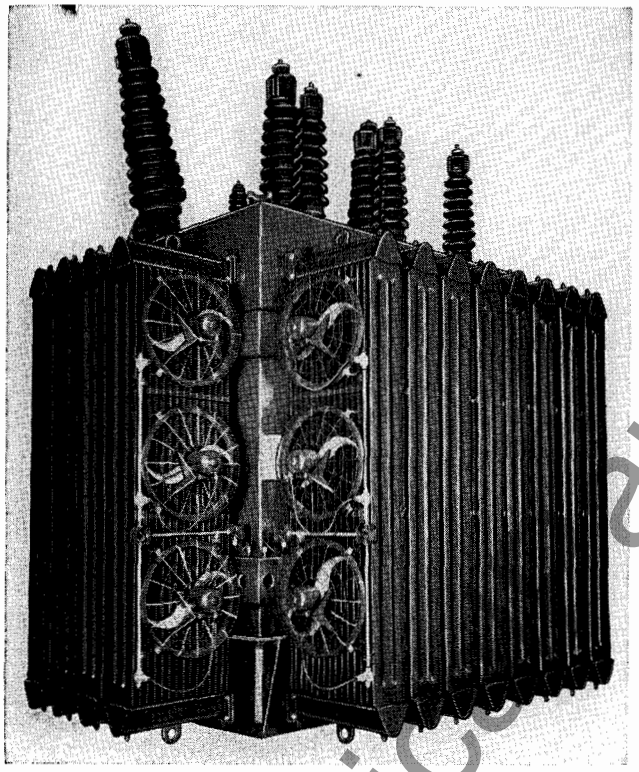

FIG. 1. Westinghouse 15 Fin Radiators Mounted Perpendicular to the Wall of a Form-Fit Tank

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DESCRIPTION

The radiator is of all-welded sheet metal construction, with vertical cooling sections through which the oil circulates and is cooled. A formed metal header, welded to each end of the assembly of sections, complete the structure and provides connections for the fittings which attach the radiator to the tank.

The individual sections are made from two flat sheets of steel of the same length, each of which is 11⅝ inches wide. To secure different lengths of radiators, these assemblies are made in lengths from four feet to fourteen feet, varied in steps of approximately one foot. The side edges of these sheets are welded together by an automatic resistance seam welding machine. Welded seams are made along the centerline the entire length of the section except for about six inches at each end. Air pressure is applied at one end of an element so that the sheets are forced apart and given a permanent set, where not restrained by the welds, to limits imposed by a restraining mould, thus forming the ducts for oil circulation.

The ends are then sheared off and formed as shown in Fig. 3. This forming of the ends provides a means for proper spacing of sections, external welding surfaces and a "hip roof" shape which eliminates horizontal surfaces between sections and insures complete drainage. The formed header is welded to the formed ends of the section assembly, thus completing the structure and providing means of attaching the radiator to the transformer tank.

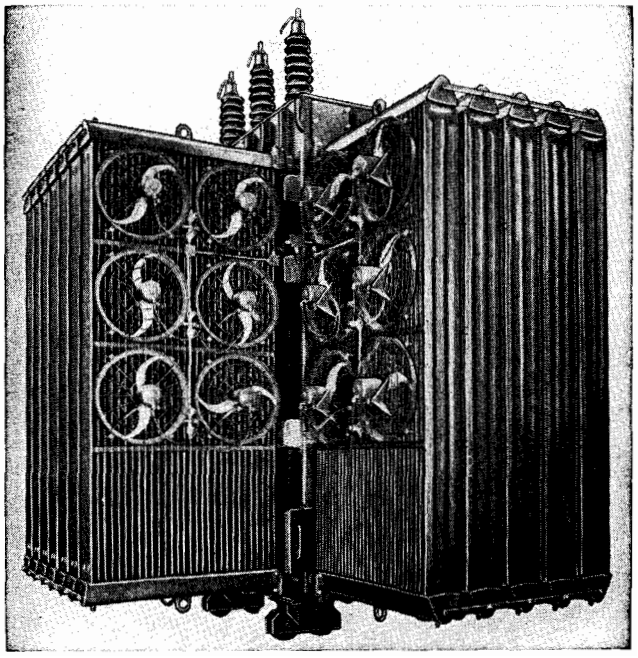

FIG. 2. Westinghouse 30-Fin Radiators Mounted Perpendicular to the Wall of a Form-Fit Tank

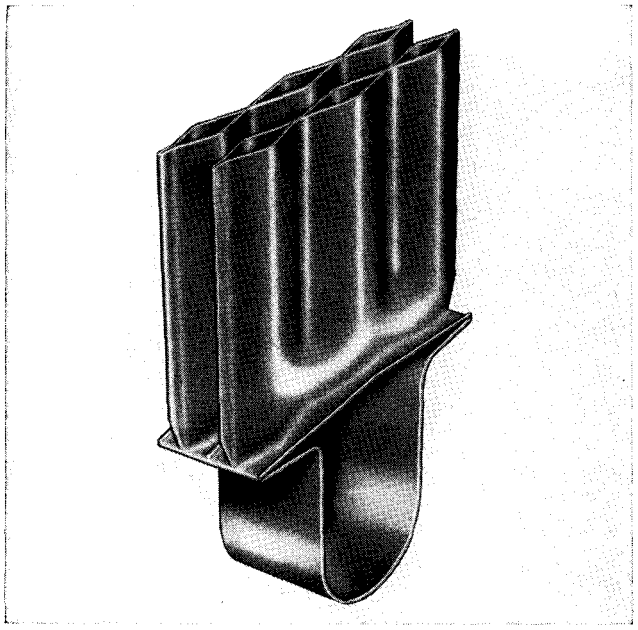

FIG. 3. Radiator Section Showing Joints Formed With Outside Welds

All joints are formed with outside edge welds which are reliable, easy to make, and permit a damaged joint to be repaired easily. Edges are trimmed and rounded for better paint adhesion. In order to produce an all over better paint job, each radiator is given a heavy phosphate coating. Then it is given one coat of primer, followed by two coats of finish paint. Each coat of paint is applied by the flow coat method and baked on in an infra-red lamp oven.

In flow coat painting, the paint is actually flowed over the surface and the surplus allowed to drain back into the main paint reservoir. This method insures complete and even paint coverage with a maximum thickness.

The "hip roof" surfaces between sections and the sloping surfaces on the caps contain no flat surfaces where water can collect and cause rusting. The weld between the sections and the header is scalloped between sections so that any bead formed by the welding operation will be depressed, insuring that no water can collect at this point.

INSTALLATION

Receiving, Handling and Storing. The usual practice is to ship all radiators with all openings on the tank and radiators protected with blind flanges. The blind flanges and shipping gaskets are for shipment only and must be replaced by the gaskets supplied for permanent mounting. Sufficient gasket cement M# 7386 and cadmium plated bolts, nuts and lock washers are also furnished for permanent mounting.

Important: Do not remove the blind flanges until ready to install the radiators. Dirt and moisture must be kept out of the radiators.

Unpacking. When unpacking, lifting or handling the radiators, care must be taken to prevent scratching the paint or damaging the radiator elements. An ample supply of grey touch-up paint is furnished to repaint any minor scratches. This paint should be applied as the radiators are being prepared for mounting. It is recommended that the radiators be lifted from the shipping crate using manila rope with sling spreaders to prevent damaging the radiator elements.

Installing Radiators. It will be found most convenient to place the radiator across suitable supports when preparing it for mounting to the tank.

First, remove the blind flanges from a radiator. The radiators are sealed against entrance of mositure in the factory. If they are stored outdoors in cold weather there can be some condensation of moisture from the air inside the radiator. It is therefore good practice to check for this condition and flush out with transformer oil when necessary. Then, clean the gasket grooves and flange faces of all paint, varnish, gasket material, etc.

Second, remove the blind flanges from a set of valves on the transformer tank and clean the gasket grooves and flange faces. Apply gaskets as per I.L. 47-600-11-D. Be sure the 3/4 inch studs are screwed tight against the shoulder on the stud before mounting the radiator.

Now lift the prepared radiator by the lifting eye in the top header and swing it into position over the valves.

Lifting of the radiator can be accomplished by using an overhead crane, an A-frame with block and tackle or by block and tackle to the station superstructure.

The end spacer strips on the 30-fin radiator may cause some difficulty if they are not bolted into

Weight of Radiators

LENGTH FEET	15-FIN		23-FIN		30-FIN	
	Dry Weight	Gals. oil	Dry Weight	Gals. Oil	Dry Weight	Gals. Oil
4	315	17.5	530	30	710	41.5
5	390	21	630	35.5	840	49.
6	465	25	730	41	970	56.5
7	540	28.5	830	46.5	1100	64.
8	615	32	930	52	1230	71.5
9	690	35.5	1030	57.5	1360	78.
10	765	39	1130	63	1490	85.5
11	840	43	1230	68.5	1620	93.
12	915	46.5	1330	74	1750	100.5
13	990	50	1430	79.5	1880	108.
14	1065	53.5	1530	85	2010	115.5

position before the radiator assembly is drawn down tightly to the tank. Caution must then be exercised to insure a good metal-to-metal contact between the header and the tank valve body.

Filling of Radiators. To fill a radiator, turn the bottom valve to the open position as indicated on the operating arm and thus allow the liquid from the main tank to flow into the radiator. Secure the valve in this open position by means of the thumb screw. Next, open the top valve and allow the entrapped air to escape. Care must be taken that the terminal boards or bridge work of the transformer are not exposed above the liquid in this operation. If there is danger of exposing the terminal boards or bridge, liquid should be added to replace that required to fill each radiator. After all radiators have been filled the normal liquid level should be restored as soon as possible or within a couple of hours.

Radiator Removal. Should it become necessary to remove a radiator, first close the valves top and bottom. Lock the operating arm in the closed position with the thumb screw. Finger tightness will provide sufficient pressure to seat the valve. Next, drain the liquid from the radiator by removing the 3/4 inch drain plug from the bottom header and the 3/4 inch vent plug from the top. After the liquid has been removed from the radiator, proceed to dismantle. If the radiator is to be left off for any length of time the transformer valves should be gasketed and covered with blind flanges. The openings in the radiators should also be gasketed and flanged to keep out dirt and moisture.

MAINTENANCE

The only maintenance required for the radiators consists of repainting or touch up, to keep the surface free from rust. The radiator element wall is of a necessity thin in section for proper cooling, and being of steel construction, is susceptible to rust and possible rupture, unless protected by a good paint finish. The open element construction permits thorough cleaning of all surfaces for repaint or touch up. This ease of accessibility insures a better finish, longer radiator life and the least possible cost of maintenance. Standard finish paint for transformer tanks can be applied as touch-up paint.

A special cleaning tool has been developed for removing rust spots or preparing the radiator surface for painting. For information about this tool, refer to Transformer Renewal Parts Catalog E-1-11.

If the packing gland at the valve operating arm leaks and requires tightening it is necessary to remove the external arm (remove one screw) to get access to the gland nut.

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